

REMARKS

This Amendment is filed in response to the final Office Action dated August 22, 2007. For the following reasons this application should be allowed and the case passed to issue. No new matter is introduced by this Amendment. The amendment to claim 1 is supported by canceled claim 3 and the specification at paragraphs [0010] and [0022]. The amendments to claims 2 and 16 are supported by paragraphs [0022] and [0023] of the specification. Canceled claim 11 and the specification at paragraphs [0010], [0023], and [0024] provide support for the amendment to claim 10. Claims 12, 15, and 17 are amended to correct informalities. New claims 21 and 23 are supported by paragraph [0041] of the specification. Support for new claims 22, 24, and 25 is found in paragraphs [0043] to [0045].

Claims 1, 2, 4-10, and 12-25 are pending in this application. Claims 1-20 have been rejected. Claims 1, 2, 10-12, 15, and 17 have been amended in this response. Claims 3 and 11 have been canceled in this response. Claims 21-25 are newly added in this response.

Claim Objections

Claim 15 was objected to as being a substantial duplicate of claim 7. This objection is traversed, and reconsideration and withdrawal thereof respectfully requested.

Claim 15 has been amended to address the asserted informality.

Claim Rejections Under 35 U.S.C. § 112

Claims 2-4, 11, 12, and 17 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for lacking proper antecedent basis. This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

The claims have been amended to correct the asserted informalities. Applicants submit that the present claims fully comport with the requirements of 35 U.S.C. § 112.

Claim Rejections Under 35 U.S.C. §§ 102/103

Claims 1-6, 8-14, and 16-19 were rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Koike (JP 07-220759).

Claims 1-6, 9-14, and 16-19 were rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Delnick (US 5,984,464).

Claims 1-4 and 8-12 were rejected under 35 U.S.C. § 103(a) as obvious over Takata et al. (US 6,638,988).

These rejections are traversed, and reconsideration and withdrawal thereof respectfully requested. The following is a comparison between the invention, as claimed, and the cited prior art.

An aspect of the invention, per claim 1, is a secondary battery comprising: a positive electrode; a negative electrode; a porous electron-insulating layer adhered to a surface of at least one selected from the group consisting of the positive electrode and the negative electrode; and an electrolyte. The porous electron-insulating layer comprises a particulate filler and a resin binder. The particulate filler substantially comprises indefinite-shape particles which have the shape of dendrites, grape clusters, or coral. The indefinite shape particles comprise a plurality of primary particles bonded to each other. The indefinite shape particles have bonding portions of the primary particles and the bonding portions comprise the same material as the primary particles.

Another aspect of the invention, per claim 10, is a secondary battery comprising: a positive electrode; a negative electrode; a porous electron-insulating layer adhered to a surface of at least one selected from the group consisting of the positive electrode and the negative electrode; and an electrolyte. The porous electron-insulating layer comprises a particulate filler

and a resin binder. The particulate filler substantially comprises indefinite-shape particles. The indefinite shape particles comprise a plurality of single crystalline particles bonded to each other and a neck formed, by partially melting the plurality of single crystalline particles, between at least a pair of the single crystalline particles that are joined to one another. The neck comprises the same material as the single crystalline particles.

Another aspect of the invention, per claim 16, is a secondary battery comprising: a positive electrode; a negative electrode; a porous electron-insulating layer adhered to a surface of at least one selected from the group consisting of the positive electrode and the negative electrode; and an electrolyte. The porous electron-insulating layer comprises a particulate filler and a resin binder. The particulate filler substantially comprises indefinite-shape particles, wherein the indefinite-shape particles are polycrystalline particles comprising a plurality of single crystalline particles that are diffusion bonded to each other.

The present claims are not anticipated by or obvious in view of Koike, Delnick, and Takata et al. because Koike, Delnick, and Takata et al. do not disclose or suggest that the particulate filler substantially comprises indefinite-shape particles which have the shape of dendrites, grape clusters, or coral, wherein the indefinite-shape particles comprise a plurality of primary particles bonded to each other, the indefinite-shape particles have bonding portions of the primary particles and the bonding portions comprise the same material as the primary particles, as required by claim 1; porous electron-insulating layer comprises a particulate filler and a resin binder, and the particulate filler substantially comprises indefinite-shape particles, wherein the indefinite-shape particles comprise a plurality of single crystalline particles bonded to each other and a neck formed, by partially melting the plurality of single crystalline particles, between at least a pair of the single crystalline particles that are joined to one another, and the

neck comprises the same material as the single crystalline particles, as required by claim 10; and the indefinite-shape particles are polycrystalline particles comprising a plurality of single crystalline particles that are diffusion bonded to each other, as required by claim 16.

Secondary batteries comprising a porous electron-insulating layer according to embodiments of the present invention have improved charge/discharge characteristics at high rate charge/discharge and low temperature charge/discharge. Porous electron-insulating layers formed using spherical or substantially spherical particles tend to form higher-density, lower-porosity layers (specification at paragraph [0006]). On the other hand, porous electron-insulating layers comprising indefinite shape particles do not form layers as dense as substantially spherical particles because of the complicated shapes of the indefinite-shape particles (specification at paragraphs [0015] and [0016]). Thus, porous electron-insulating layers with higher porosity are formed providing a significant improvement in high-rate and low-temperature charge/discharge properties (specification at paragraph [0015]). The indefinite-shape particles according to the present invention are not easily disintegrated into independent primary particles upon application of a shearing force thereto or mixing in a slurry or solution. Whereas, particles that are merely agglomerated would become separated into independent particles by the application of shearing force, and particles that are held together by a binder could become separated if dissolved in a solution or mixed in a slurry.

As clearly illustrated in Figs. 1 and 2, Koike discloses that the particles are either spherical or substantially spherical. The Examiner asserted, however, that because Koike discloses a binder (PVdF) mixed with alumina particles, indefinite-shape particles would inherently or naturally form. The Examiner averred that the silica filler and resin binder of Delnick form indefinite shape particles. As regards Takata et al., the Examiner opined that

organic and inorganic fillers are art recognized equivalents and that when a mixture of organic fillers and resin binders are kneaded in a kneader, the organic filler particles will naturally aggregate and form indefinite-shape particles comprising shapes of dendrites, grape clusters, or coral.

The Examiner's conclusion that organic and inorganic fillers are art-recognized equivalents is traversed. In order to rely on equivalence as a rationale supporting an obviousness rejection, the equivalency must be recognized in the prior art, and cannot be based on applicant's disclosure or the mere fact that the components at issue are functional or mechanical equivalents. *In re Ruff*, 256 F.2d 590, 118 USPQ 340 (CCPA 1958). For example, organic and inorganic fillers have widely different operating temperatures. Many common organic fillers decompose at temperatures much lower than the inorganic filler melting points. Thus, it is clear that inorganic fillers and organic fillers are not art recognized equivalents.

Even if it is assumed that the binder joins the round particles of Koike together to form indefinite-shape particles, Koike does not disclose or suggest the indefinite shape particles comprising a **plurality of primary particles bonded to each other, and the indefinite-shape particles have bonding portions of the primary particles and the bonding portions comprise the same material as the primary particles**, as required by claim 1; indefinite-shape particles comprising a plurality of single crystalline particles bonded to each other and a **neck formed, by partially melting the plurality of single crystalline particles, between at least a pair of the single crystalline particles that are joined to one another, and the neck comprises the same material as the single crystalline particles**, as required by claim 10; and the indefinite-shape particles are polycrystalline particles comprising a **plurality of single crystalline particles that are diffusion bonded to each other**, as required by claim 16. Koike

does not suggest bonding portions of primary particles comprising the same material as the primary particles, forming a neck between a pair of single crystalline particles by partially melting a plurality of single crystalline particles, a neck comprising the same material as the single crystalline particles, and a plurality of single crystalline particles that are diffusion bonded to each other.

Likewise, Delnick discloses a binder joining round filler particles and does not disclose or suggest the indefinite-shape particles comprising a **plurality of primary particles bonded to each other, and the indefinite-shape particles have bonding portions of the primary particles and the bonding portions comprise the same material as the primary particles**, as required by claim 1; indefinite-shape particles comprising a plurality of single crystalline particles bonded to each other and **a neck formed, by partially melting the plurality of single crystalline particles, between at least a pair of the single crystalline particles that are joined to one another, and the neck comprises the same material as the single crystalline particles**, as required by claim 10; and the indefinite-shape particles are polycrystalline particles comprising a **plurality of single crystalline particles that are diffusion bonded to each other**, as required by claim 16. Delnick does not suggest bonding portions of primary particles comprising the same material as the primary particles, forming a neck between a pair of single crystalline particles by partially melting a plurality of single crystalline particles, a neck comprising the same material as the single crystalline particles, and a plurality of single crystalline particles that are diffusion bonded to each other.

Even if it is assumed that the mixture of organic fillers and resin binder joins the organic filler particles of Takata et al. together to form indefinite shape particles, Takata et al. do not disclose or suggest the indefinite-shape particles comprising a **plurality of primary particles**

bonded to each other, the indefinite shape particles having bonding portions of the primary particles and the bonding portions comprise the same material as the primary particles, as required by claim 1; indefinite-shape particles comprising a plurality of single crystalline particles bonded to each other and a neck formed, by partially melting the plurality of single crystalline particles, between at least a pair of the single crystalline particles that are joined to one another, and the neck comprises the same material as the single crystalline particles, as required by claim 10; and the indefinite-shape particles are polycrystalline particles comprising a plurality of single crystalline particles that are diffusion bonded to each other, as required by claim 16. Takata et al. do not suggest bonding portions of primary particles comprising the same material as the primary particles, forming a neck between a pair of single crystalline particles by partially melting a plurality of single crystalline particles, a neck comprising the same material as the single crystalline particles, and a plurality of single crystalline particles that are diffusion bonded to each other.

The factual determination of lack of novelty under 35 U.S.C. § 102 requires the disclosure in a single reference of each element of a claimed invention. *Helifix Ltd. v. Blok-Lok Ltd.*, 208 F.3d 1339, 54 USPQ2d 1299 (Fed. Cir. 2000); *Electro Medical Systems S.A. v. Cooper Life Sciences, Inc.*, 34 F.3d 1048, 32 USPQ2d 1017 (Fed. Cir. 1994); *Hoover Group, Inc. v. Custom Metalcraft, Inc.*, 66 F.3d 399, 36 USPQ2d 1101 (Fed. Cir. 1995); *Minnesota Mining & Manufacturing Co. v. Johnson & Johnson Orthopaedics, Inc.*, 976 F.2d 1559, 24 USPQ2d 1321 (Fed. Cir. 1992); *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051 (Fed. Cir. 1987). Because Koike, Delnick, and Takata et al. do not disclose that the particulate filler substantially comprises indefinite-shape particles which have the shape of dendrites, grape clusters, or coral, wherein the indefinite shape particles comprise a plurality of

plurality of primary particles bonded to each other, and the indefinite-shape particles have bonding portions of the primary particles and the bonding portions comprise the same material as the primary particles, as required by claim 1; indefinite-shape particles comprising a plurality of single crystalline particles bonded to each other and a neck formed, by partially melting the plurality of single crystalline particles, between at least a pair of the single crystalline particles that are joined to one another, and the neck comprises the same material as the single crystalline particles, as required by claim 10; and the indefinite-shape particles are polycrystalline particles comprising a plurality of single crystalline particles that are diffusion bonded to each other, as required by claim 16, Koike, Delnick, and Takata et al. do not anticipate claims 1, 10, and 16.

Obviousness can be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge readily available to one of ordinary skill in the art. *In re Kotzab*, 217 F.3d 1365, 1370 55 USPQ2d 1313, 1317 (Fed. Cir. 2000); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). There is no suggestion in Koike, Delnick, or Takata et al. to modify the Koike, Delnick, or Takata et al. batteries so that the particulate filler substantially comprises indefinite-shape particles which have the shape of dendrites, grape clusters, or coral, wherein the indefinite-shape particles comprise a plurality of primary particles bonded to each other, and the indefinite-shape particles have bonding portions of the primary particles and the bonding portions comprise the same material as the primary particles, as required by claim 1; indefinite shape particles comprising a plurality of single crystalline particles bonded to each other and a neck formed, by partially melting the plurality of single crystalline particles, between at least a pair of the single crystalline particles that are joined to

one another, and the neck comprises the same material as the single crystalline particles, as required by claim 10; and the indefinite-shape particles are polycrystalline particles comprising a plurality of single crystalline particles that are diffusion bonded to each other, as required by claim 16.

The only teaching of the claimed secondary batteries is found in Applicants' disclosure. However, the teaching or suggestion to make a claimed combination and the reasonable expectation of success must not be based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Claims 7, 15, and 20 were rejected under 35 U.S.C. § 103(a) as obvious over Koike in view of Waterhouse (U.S. Pat. No. 4,363,856).

Claims 7, 15, and 20 were rejected under 35 U.S.C. § 103(a) as obvious over Delnick in view of Waterhouse.

Claims 7 and 15 were rejected under 35 U.S.C. § 103(a) as obvious over Takata et al. in view of Waterhouse.

These rejections are traversed, and reconsideration and withdrawal thereof respectfully requested.

The combination of Koike, Delnick, or Takata et al. and Waterhouse does not suggest the claimed secondary battery because Waterhouse does not cure the deficiencies of Koike, Takata, and Takata et al. Waterhouse does not suggest that the particulate filler substantially comprises indefinite-shape particles which have the shape of dendrites, grape clusters, or coral, wherein a plurality of primary particles bonded to each other, and the indefinite-shape particles have bonding portions of the primary particles and the bonding portions comprise the same material as the primary particles, as required by claim 1; indefinite-shape particles comprising a plurality of

single crystalline particles bonded to each other and a neck formed, by partially melting the plurality of single crystalline particles, between at least a pair of the single crystalline particles that are joined to one another, and the neck comprises the same material as the single crystalline particles, as required by claim 10; and the indefinite-shape particles are polycrystalline particles comprising a plurality of single crystalline particles that are diffusion bonded to each other, as required by claim 16.

The dependent claims are allowable for at least the same reasons as the independent claims from which they depend, and further distinguish the claimed secondary batteries.

In view of the above amendments and remarks, Applicants submit that this application should be allowed and the case passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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